

PTSD AND COPING MECHANISMS
IN THE
FIRE SERVICE

By

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FIRE SERVICE

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Abstract: Emergency service workers, or more specifically firefighters, witness life threatening events throughout the course of performing their duties on a regular basis, placing them at higher risk for developing PTSD. Although this is the case, research pertaining to PTSD in the fire service is rather limited. Coping mechanisms also play a significant role in one's propensity for developing PTSD.

This study was conducted using an Internet survey with the Professional Firefighters of Massachusetts (PFFM) in order to evaluate the factors associated with PTSD symptom levels. The study investigated the relationship between repeated exposure due to both call volume and time in service, and evaluated coping mechanisms used by the firefighters. As expected, there was a positive association between repeated exposure and an increase in PTSD symptom scores. The study also shows a relationship between coping mechanisms and the firefighter's PTSD symptom score. The study also confirms previous research that presented evidence that mindfulness and meditation can play a significant role in the prevention of PTSD symptom scores.

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CHAPTER I

INTRODUCTION

Firefighters are the people who go running into an emergency scene when everyone else is running out. Firefighters are thought to be “tough macho guys” (L. Miller, 1995; Wagner, Martin, & Mcfee, 2009). What happens when a firefighter experiences traumatic events repeatedly throughout the course of their career? Do firefighters have an effective means of coping with repeated exposure to trauma? Are there activities that can help alleviate the effects of exposure to trauma?

Posttraumatic stress disorder (PTSD) is a psychological condition that manifests itself in people who have experienced or witnessed people who have experienced, life threatening events (Haslam & Mallon, 2003). Emergency service workers, more specifically firefighters, witness life threatening events throughout the course of performing their duties on a regular basis (Del Ben, Scotti, Chen, & Fortson, 2006). Although this is the case, PTSD in firefighters is a relatively understudied phenomena (Carpenter et al., 2015).

Although this is a psychological issue, there are physical and biological responses that take place when someone suffers from PTSD (LeBlanc et al., 2008; Olf et al., 2005; Pfefferbaum, Jacobs, Griffin, & Houston, 2015). When a person is placed in a stressful situation,

Their sympathetic nervous system (fight or flight) is activated. The activation of the sympathetic nervous system causes catecholamines like epinephrine (adrenalin) and norepinephrine as well as Cortisol (a glucocorticoid hormone) to be released into the blood stream and central nervous system. This causes the sympathetic nervous system to increase heart rate and blood pressure (to increase blood flow to vital organs), respiratory rate to increase (increase the amount of oxygen in the blood), and pupil dilation (to increase the ability to see). In a subject without PTSD, these symptoms dissipate (over hours) once a stressor has been eliminated. However, in someone with PTSD symptoms, the catecholamine levels remain elevated (Heinrichs et al., 2005; van Der Kolk & Saporta, 2007).

LeBlance et al. (2008 p.78) describe this as the following:

“From a physiological perspective, the sympathetic nervous system is activated, leading to a rapid increase in heart rate as a result of the release of the stimulants epinephrine and norepinephrine into the blood stream. Simultaneously, the hypothalamic-pituitary-adrenal (HPA) axis is activated, leading to the release of the hormone cortisol into the bloodstream, which is then diffused to the saliva and eventually excreted into the urine.”

Cardiovascular disease is the leading cause of firefighter death in the United States (Jahnke, Poston, Jitnarin, & C. Keith Haddock, 2012; Rosenstock & Olsen, 2007; D. L. Smith, Barr, & Kales, 2013) followed closely by cancer (Fritschi & Glass, 2014; LeMasters et al., 2006). The repeated or prolonged stimulation of the sympathetic nervous system has been linked to cardiovascular diseases such as hypertension and heart failure (ESLER, 2002; Kales, Tsismenakis, Zhang, & Soteriades, 2009; Parati & Esler, 2012). Additionally, there have been links between sympathetic nervous system activation and the increase in the activity of metastatic cancer cells (Sloan et al., 2010). Studies have also shown that the immune system is hampered by

stress and sympathetic nervous system activation (Maria, Reiche, Odebrecht, Nunes, & Morimoto, 2004).

Although PTSD is a psychological diagnosis, the evidence is clear that there are multiple long-lasting physical ailments that can be tied to increased mortality risks for firefighters. These diseases also bring an increase in loss of time from work. This can have a significant economic effect on the department and the municipality.

There have been studies performed related to repeated exposure to traumatic events and the propensity for developing PTSD both in military personnel (Kline et al., 2010; MacGregor, Han, Dougherty, & Galarneau, 2012), as well as civilians (Brewin, Andrews, & Valentine, 2000; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993). This study will evaluate the effect of repeated exposure to traumatic events for firefighters, more specifically, the relationship between the length of a firefighter's career and their level of PTSD symptoms.

This study will also evaluate the way that firefighters cope with stress. It will assess whether they cope in positive or negative manners and the effect that has on their level of PTSD. Finally, there have been studies regarding mindfulness and their ability to lessen the propensity for PTSD (Grossman, Niemann, Schmidt, & Walach, 2004; Shapiro, Schwartz, & Bonner, 1998; B. W. Smith et al., 2011). This study will evaluate whether or not there is a correlation between a firefighter practicing mindfulness and their level of PTSD symptoms.

RQ1: How do multiple exposures to traumatic events affect a firefighter's level of PTSD symptoms?

RQ2: Does the way in which a firefighter copes with stress have an effect on their level of PTSD symptoms?

RQ3: Is there a relationship between whether or not a firefighter practices mindfulness/meditation and their level of PTSD symptoms?

Organization of the Thesis

Chapter two is a literature review examining research related to firefighters, police officers, paramedics, military personnel, and other related groups. This chapter examines previous research on the causes of PTSD, as well as challenges in predicting and identifying those who will or are currently suffering from PTSD. It will also explore how coping mechanism affect PTSD in the first responder. Chapter three discusses the methods used to examine the research questions posited above. I used self-reported measures of PTSD levels modified from the posttraumatic diagnostic scale (PDS-5). I then examined where firefighters fell on the self-reported scale based on years of service, the number of calls responded to involving deaths, and the types of coping mechanisms used by respondents, including mindfulness and meditation. Chapter four includes the analysis of survey responses and briefly discusses the results. I find that the type of coping mechanisms employed has a direct effect on self-reported PTSD scores. Finally, in Chapter five, I discuss the implications and conclusions drawn from the study results. I make concrete suggestions for how fire departments can engage firefighters in developing positive coping mechanisms to lessen the risk of PTSD in the fire service.

CHAPTER II

LITERATURE REVIEW

PTSD is a psychological condition that some people develop after experiencing or witnessing a life-threatening event. The condition involves having intense feelings and emotions well after the event has ended (Parekh, 2017). Symptoms may include: Hyperarousal (irritability, increased startle reaction, hypervigilance, sleep issues, concentration problems), reexperiencing (vivid memories, nightmares, etc.), and avoidance and emotional numbing (avoiding things that evoke memories of the event, loss of interest, feeling alone) (Nydegger, Nydegger, & Basile, 2011). Studies show that the general public has a lifetime occurrence of PTSD as low as 1.3% (Del Ben et al., 2006) to as high as 7.8% (Kessler et al., 2005).

The incidents of firefighter PTSD rates also has a significant difference in reporting levels in prior research. According to a study performed in 1991, 8% of firefighters suffer from PTSD (Andersen, Christensen, & Petersen, 1991). Yet, a 2012 review reported that firefighter PTSD rates are at 21% (Javidi & Yadollahie, 2012). One of the key findings across most of these studies is that the testing mechanisms to diagnose PTSD offer a significant amount of subjectivity

and may be a reason for the varied responses (Fraess-Phillips, Wagner, & Harris, 2017; Kessler et al., 2005; Olff et al., 2005; Richardson, Frueh, & Acierno, 2010). Regardless of the study, when comparing the low numbers or the high numbers, firefighters are at a significantly higher risk for PTSD than the public at large.

Causes

There is no perfect predictor of who will suffer from PTSD, but a number of studies have examined the potential causes in high stress environments, such as the military, police, and the fire service. A 2000 study of military peacekeepers shows that there may be some personality traits that predispose a person to PTSD (Bramsen, Dirkzwager, & van der Ploeg, 2000). This is one of the few studies that compared pre and post deployment scores and traits. They found that the number of stressors while on deployment had the most significant impact on PTSD scores. This was followed by two personality traits, negativism and psychopathology. If someone had a negative outlook prior to deployment or possessed psychopathic traits, they were more likely to have an increased score compared to their counterparts who did not. Finally, the age of the participant affected their scores. The younger the respondent, the higher the PTSD score.

A firefighter that has experienced previous traumatic events prior to becoming a firefighter, places them at a higher risk for PTSD (Armstrong, Shakespeare-finch, & Shochet, 2014; Bryant & Guthrie, 2005a, 2007; Meyer et al., 2012; Shakespeare-finch, Gow, & Smith, 2005). When someone has experienced trauma in their personal life, frequently those thoughts and images resurface while on the job. A person may be able to avoid those situations in a civilian capacity, however, a firefighter may not be able to avoid being in a situation that triggers these memories because of the nature of their work (Armstrong et al., 2014; Nydegger et al., 2011).

As the number of calls that firefighters and other emergency responders respond to increases, their PTSD levels tend to increase as well (R. D. Beaton & Murphy, 1993; Corneil, Beaton, Murphy, Johnson, & Pike, 1999; Haslam & Mallon, 2003; Nydegger et al., 2011). Haslam and Mallon (2003) posit that smaller events are as relevant as larger events because they accumulate over time. A firefighter may respond to one or two major incidents in their career; yet respond to hundreds or thousands of “routine calls” and still experience PTSD symptoms. Other research has found a similar experience in the military. Studies have shown that the more days a soldier spends on the ground in war, may contribute to an increase in the level of PTSD related symptoms they experience (Bramsen et al., 2000; Richardson et al., 2010).

There are also studies that tie single “significant incidents” to an increase in PTSD and related symptoms (Berninger et al., 2010; North et al., 2015; North, Tivis, McMillen, Pfefferbaum, Spitznagel, et al., 2002; Pfefferbaum, Tucker, North, Jeon-Slaughter, & Nitiéma, 2014; Pietrzak et al., 2014). North et al. (2002) found that firefighters who responded to the Oklahoma City bombing were more likely to experience PTSD as well as other psychological symptoms than their colleagues who did not respond to this event. Berninger et al. (2010), had similar findings related to firefighters that responded to the World Trade Center bombing in 1999.

Predicting

Moran (2001) and later Meyer et al. (2012) posit that three factors play a significant role in predicting PTSD. The first is that firefighters that have developed a positive coping strategy have negative correlations to PTSD symptoms (Milen, 2009). Additionally, having a strong social support system whether it be at home, the firehouse, or both also decreases the likelihood of PTSD (Meyer et al., 2012; North, Tivis, McMillen, Pfefferbaum, Cox, et al., 2002). Finally, occupational stressors are directly related to rates. One would expect that the stressors are the

calls that firefighters respond to: however, they also include their perception of the way the fire department takes care of them (An et al., 2015; Sattler, Boyd, & Kirsch, 2014).

There were two studies in 2005 that brought to the forefront the importance of self-efficacy in an individual's predisposition to PTSD (Bryant & Guthrie, 2005b; Heinrichs et al., 2005). Self-efficacy can be defined as "one's belief in one's own capability to exercise some control over one's functioning and to cope with stressful events" (Prati, Pietrantonio, & Cicognani, 2010, p. 464). Both studies evaluated fire recruits before they were on the street as firefighters and then surveyed the same firefighters two years later. In both studies, they found that low self-efficacy scores meant higher PTSD rates. This study was repeated in 2007 by Bryant and Guthrie with similar findings (Bryant & Guthrie, 2007). Nydegger et al. (2011) takes it a step further and reports that the way a firefighter perceives their role in an event (the way they performed) also has a significant effect on PTSD levels (Nydegger et al., 2011).

Coping

Perhaps one of the most significant factors of decreasing a firefighter's levels of PTSD is having an effective means to cope (Haslam & Mallon, 2003; Malek, Fahrudin, & Kamil, 2009; Milen, 2009; Moran, 2001). Coping is the "conscious purposeful effort" to deal with a problem or situation (Cramer, 2003). In 1999, Beaton et al., concluded that a firefighter who has a positive way of coping, will have a lower level of PTSD related symptoms than a firefighter who does not (Beaton, Murphy, Johnson, Pike, & Corneil, 1999). Similar findings were present in a 2008 study of police recruits. They found that those recruits that used avoidance as their means of coping, created higher levels of traumatic stress than their counterparts who used task oriented coping (LeBlanc et al., 2008).

There have been several studies that report that although buffering may not be effective, using humor as a coping mechanism can be. "Utilizing humor as a positive way of coping with a

demanding or stressful situation where optimism may not be practical can be (an) effective (way to cope)” (Slitter, Kale, & Yuan, 2014). Several studies show that emergency workers have a tendency to use humor as a coping mechanism. Because joking takes place around the firehouse, the tendency is for the firefighters who use humor to cope to have lower levels of PTSD related issues. Although humor may be considered buffering, it is still a positive means of the firefighter actually coping and releasing some of the stress associated with the event (Avraham, Goldblatt, & Yafe, 2014; Milen, 2009; Scott & Myers, 2005; Slitter et al., 2014).

Buffering is a way of compartmentalizing and avoiding an issue (Scott & Myers, 2005). Commonly firefighters use buffering as their main coping mechanism. Despite its use, buffering is not considered an effective means of coping. Beaton et al. (1999), refer to “cognitive avoidance, placing the situation out of their mind, out of their emotion, or withdrawing.” Their study shows that buffering actually increases the likelihood of having higher levels of PTSD and related symptoms. With buffering, issues are not dealt with, just avoided (Beaton et al., 1999). Held et al. (2011), had similar findings while studying war veterans. They found that “disengagement coping” (similar concept as buffering) was positively associated with worsening PTSD symptoms (Held, Owens, Schumm, Chard, & Hansel, 2011).

Another coping mechanism that may be used is substance abuse (R. Beaton et al., 1999; North et al., 2013; North, Tivis, McMillen, Pfefferbaum, Spitznagel, et al., 2002). Pfefferbaum & Doughty (2001), posit firefighters have a greater than one and a half times higher likelihood to have alcohol related issues than the general public (Pfefferbaum & Doughty, 2001). This is significantly lower than Murphy et al. (2002) have reported. They posit that between 29% and 42% of firefighters studied, had alcohol related issues, this is compared to 7.4% of the general population. The actual rates are difficult to determine due to self-reported information (Murphy, Bond, Beaton, Murphy, & Johnson, 2002).

Prevention

All of the previously mentioned studies deal with cause, effect, and how to cope with PTSD. There are multiple studies that have evaluated ways of preventing or lessening the chances of suffering from PTSD as well as decreasing the effects (Shapiro et al., 1998; B. W. Smith et al., 2011; Tang et al., 2007). The latest studies show that mindfulness can have a significant effect on PTSD related symptoms. Mindfulness is the ability to pay attention to and be aware of present moment experiences (Kabat-Zinn et al., 1992).

Arnetz (2009), performed a study of police officer recruits who were given mindfulness training. The study showed that those receiving the training were less likely to suffer from PTSD. In addition, those receiving the training had lower incidents of alcohol related issues and they had faster physiologic recovery than their counterparts that did not receive the training. (Arnetz, Nevedal, Lumley, Backman, & Lublin, 2009). They repeated the study in 2013 with a larger sampling and had largely similar findings (Arnetz, Arble, Backman, Lynch, & Lublin, 2013). Additionally, both studies found that the recruits that received the training were able to make decisions more accurately and faster than those that had not received the training.

Smith et al. (2011) posits firefighters that practiced mindfulness, or some other form of meditation, were less likely to suffer from PTSD as well as other psychological and physical ailments. This was shown again in a study pertaining to medical professionals in 2005. The treatment group (those receiving mindfulness training) had significantly lower levels of stress and burnout. They also had higher rates of job satisfaction and performance than those in the control group (Shapiro, Astin, Bishop, & Cordova, 2005).

There is evidence to support that in addition to the self-reported psychological benefits of mindfulness there is a physiological response that takes place as well. There are alterations to the brain as well as immune functional improvements that take place when one practices mindfulness

(Davidson et al., 2003). Mindfulness has also been shown to decrease the amount of change in Cortisol levels, heart rate, and Antithrombin release in those that practice mindfulness compared to those that do not (Arnetz et al., 2009).

Based on the literature above, I would expect to find that there is a relationship between the amount of time on the job as a firefighter and the level of PTSD symptoms that firefighters experience. Additionally, I would expect to see a relationship between positive coping strategies and lower PTSD symptom scores than respondents that use negative coping strategies. Finally, I would anticipate that firefighters that practice mindfulness would have a lower PTSD symptom score than those that do not. Chapter three will discuss the methods used to examine these relationships.

CHAPTER III

METHODOLOGY

This study was performed using an Internet survey. The survey was created (Appendix A), submitted to, and approved by the Oklahoma State University IRB. The survey included a participant release form (Appendix B) that was required to be signed (electronically) prior to completing the survey. All survey questions were optional to answer without a prerequisite to move on to the next question. The survey instrument prevented a respondent from responding multiple times. Respondents were given the opportunity to be entered into a drawing for a \$100 gift card upon completion of the survey. The use of lotteries as an incentive to respondents to participate in a survey, increases the expected response rate (Baruch & Holtom, 2008; Deutskens, Ruyter, Wetzels, & Oosterveld, 2004).

The survey consisted of nine questions pertaining to the respondent's demographic information, their department, and the number of calls they respond to. There were 12 questions regarding PTSD and depression using a five-point Likert scale. The remaining questions related to the respondent's drug and alcohol use, perception about psychiatric issues, and their use of mindfulness or meditation. There was one open-ended question asking about how the respondents

relieve stress.

Participants

The survey sample was a convenience sample utilizing the Professional Firefighter of Massachusetts (PFFM), therefore it was not a random sample. The PFFM is the state organization of the International Association of Firefighters (IAFF) for the Commonwealth of Massachusetts. The PFFM consists of approximately 11,000 career firefighters. A survey link was provided to the PFFM who forwarded the link via email to their membership. Following the guidelines of Millar and Dillman (2011), an email reminder was sent out two additional times one week apart (Millar & Dillman, 2011). The response rate after the initial email and subsequent reminders, was 799 firefighters, with 787 completing the survey ($n = 787$). 95.6% of the respondents were male, 81.9% were between the ages of 25 and 55. 39.2% ($n = 304$) had greater than 20 years on the job, followed by 19.3% ($n = 150$) having between 11 and 15 years of experience. Nearly all (766 of 773) of the respondents respond to emergency medical service (EMS) calls.

Research has shown that Internet surveys have between a 20% and 40% average response rate. Fan & Yan (2010) posit that trust is one of the more significant factors when evaluating response rates of Internet surveys (Fan & Yan, 2010). In 2017, Bista & Saleh conducted research about Internet survey response rates. They reported that 72% of the respondents were female. I posit that with 95% of the respondents being male, and potentially having a low level of trust that the survey will be confidential, played a significant role in the low response rate of 7.3%.

Dependent Variable

The Posttraumatic Diagnostic Scale (PDS-5) is a 24 question self-reported survey administered by professionals to determine the level of PTSD that a person may have (Foa et al., 2015). I modified the 24 question PDS-5, combining like questions to create a seven question PTSD symptom survey (see Table 1). Research shows that respondents are less likely to complete

a survey that is repetitive or takes more than 15 minutes to complete (Bista & Saleh, 2017). This survey was used as a tool to measure self-reported levels of PTSD symptoms, not as a diagnostic tool. The questions pertaining to emotional and physical responses were already covered in other questions. Additionally, questions pertaining to feelings of fear, anger, irritability, and blame were combined. There are several questions in the PDS-5 that relate to depression that were also asked in other questions. Finally, questions pertaining to substance abuse were asked separately and not used to calculate the score. The PDS-5 also includes a series of questions related to timing after the event; however, this is a non-diagnostic survey and I am examining whether multiple events affect PTSD scale responses; therefore, I removed the timing questions from the survey. The PTSD symptom survey had five available responses: (1) Never (2) Almost Never (3) Sometimes (4) Almost Always (5) Always.

Table 1: PTSD Symptom Survey

<ol style="list-style-type: none"> 1. Have you had recurring unwanted thoughts about a traumatic call? 2. Have you had nightmares or upsetting dreams about a traumatic call? 3. Have you found yourself reliving a traumatic call as if it were happening again? 4. Have you found yourself having issues with irritability, sleeplessness, jumpiness, or anger following a traumatic call? 5. Have you had sleep issues (either inability to sleep well or sleeping excessively)? 6. Have you found yourself being overly alert or on guard (examples: checking to see who is around you, not being comfortable with your back to the door) following a traumatic call? 7. Have you found yourself having trouble concentrating following a traumatic call?
--

The dependent variable is a scale variable developed from the 7 questions in Table 1. Chronbach's Alpha was used to examine internal consistency for the responses, and the alpha (0.89) is within an acceptable range for internal consistency. In order to determine the validity of the scale, I performed factor analysis on the responses to the questions. The factor analysis confirmed one variable with an eigenvalue of 3.90. The next potential factor had a value of 0.24. See Table 2 for factor loadings after varimax rotation. The dependent variable is a composite variable of the responses for the 7 questions.

Table 2: Factor Score Loadings for PTSD Scale

Variable	Factor Score
Unwanted Thoughts	0.76
Nightmares	0.80
Reliving Traumatic Call	0.76
Irritability, Sleeplessness, etc	0.79
Sleep Issues	0.60
Overly Alert	0.71
Trouble Concentrating	0.75

Eigenvalue 3.903 N=730

Independent Variables

There was a total of five independent variables that were used for this study. The first two are proxy measures for repeated exposure. One measure was the number of years that a respondent had been a firefighter. The second proxy measures the number of times in the past year a respondent responded to a call involving a death. Coping mechanisms are also measured in two different ways. The first is a variable that measures whether a coping mechanism is positive or negative. The second evaluated whether the respondent used coping in isolation or coping strategies that involved others. Finally, the last independent variable measures whether a respondent practices mindfulness and/or meditation.

Repeated Exposure

Studies show that experiencing multiple traumatic events has a cumulative effect on PTSD symptomology (Armstrong et al., 2014; Avraham et al., 2014). The assumption is that a firefighter will experience a greater number of traumatic events, the longer they are a firefighter. For this study, two independent variables were used as proxy measures of repeated exposure to examine the effect on self-reported PTSD levels. First, respondents were asked to identify how many years they had been a career firefighter. Responses were coded as a categorical variable with response categories 1 = 0-5 years, 2=6-10 years, 3 = 11-15 years, 4 = 16-20 years, and 5 = >20 years. Respondents were further asked to identify how many calls for service they responded

to in that last year involved a death. Responses were coded as a categorical variable with response categories 1 = 0 calls, 2 = 1-10 calls, 3 = 11-20 calls, 4 = 21-30 calls, and 5 = >30 calls.

Coping Skills

Previous research on PTSD in emergency service personnel has shown that some coping mechanisms may help alleviate PTSD symptoms, while others do not (Haslam & Mallon, 2003; Meyer et al., 2012; Milen, 2009). There are a number of ways that one can cope including, humor, task-oriented coping, avoidance, and substance abuse to name a few. Respondents were asked an open-ended question, “How do you relieve stress?”. The purpose of this open-ended question was to identify how firefighters think they cope with job related stress, without predefining coping mechanisms for the respondent. In order to examine the relationship between the identified coping mechanisms, data driven coding was used to develop themes around the responses (DeCuir-Gunby, Marshall, & McCulloch, 2011). There were three themes that continued to repeat themselves. The coping mechanisms fell into positive and negative categories. They also had a definite delineation between physical and emotional coping. Both of those categories would be expected. The third theme dealt with coping in isolation or with others.

The data was coded by two researchers. There was initial agreement of 96% between the two researchers. The remaining 4% were discussed and answers were agreed upon by both researchers. This confirmed that the coding was reliable (Saldaña, 2016). All categories were mutually exclusive (only placed in one category).

The majority of the respondents that answered the question (82%) utilized positive coping mechanisms. Positive coping mechanisms tended to fall into one of five categories: performing in physical exercise, engaging in hobbies, socializing, engaging in entertainment, and seeking support (Bowen, Edwards, Lingard, & Cattell, 2013). Many of the positive answers involved exercise or talking to others:

“I spend time with my family” “Going to the gym” “I speak to my therapist”
“Gym, family peer support” “Hanging with my family and friends” “I like to play sports and go to Cape Cod.”

There were also answers relating to spirituality and meditation:

“Mindfulness exercises” “Prayer” “Alcoholics Anonymous” “Workouts, yoga, outdoor activities, music, breathing exercises” “Church”

The number of respondents that utilized negative or destructive coping mechanisms was significantly smaller (13%). Negative coping mechanism may involve apathy, withdrawal, or avoidance (Parikh, Taukari, & Bhattacharya, 2004). Bowen et al. (2013) also refers to nicotine, alcohol and narcotic use being a common maladaptive form of coping. The negative answers in the survey followed these same themes.

“I drink” “Alcohol” “I self-medicate” “Beer” “Marijuana, masturbation, dangerous sex” “I keep as busy as possible and go to bed exhausted to get sleep. In other words, I avoid those quiet moments as much as I can” “I’m not good at relieving stress. I don’t like to be away from work.”

There was a third category (5%) that listed a combination of productive and destructive coping mechanisms. Additionally, the question of social drinking comes into play. Is that considered a negative because of the alcohol or a positive because of the human interaction? For this study it was treated as a combination.

“Shooting, drinking, bike riding” “Drink alcohol, masturbate, workout, work side job drink coffee” “Weightlifting, strippers” “Drinking, vacation, workout”

One of the challenges with coding these answers was determining what the respondent meant. Is smoking a cigar destructive because of the increased cancer risk, or does smoking an

occasional cigar allow them some quiet time? When someone says that they sit alone, are they withdrawing, or do they just need some quiet time to decompress? However, these are not uncommon challenges (Kapoulas & Mitic, 2012).

Typically, firefighters are thought to have extroverted personalities (Wagner et al., 2009). Extroverts are people that prefer to be in highly social environments. They prefer to be in a group rather than alone and process information by talking with others. An extrovert would cope by talking to others and preferring to be in social situations. This is in comparison to introverts, who are said to be more introspective, enjoying quiet time to think and deliberate without other people (Emerson, English, & McGoldrick, 2016). An introvert would prefer to cope by being alone, going for a quiet walk or similar type activities. An unexpected result of this study was finding that only 27% of the answers related to coping with others. Likewise, 67% of respondent's answers were geared towards coping in isolation with the remainder being a combination.

Examples of some of coping in isolation answers are:

“Meditation, exercise” “Watch tv or some other mindless task” “Work my dogs”
“Walk, lift weights, nap, or listen to music” “Motorcycle” “Watch porn” “Be
alone” “Carpentry” “Workout, hike, read” “Sleep” “Read, search topics of high
interest”

Some examples of the activities of those that preferred coping with others include:

“Talking with friends” “Spend time with family” “Hanging out with my four
girls” “Sex with girls” “Hanging with family and friends” “Sports, time with my
kids, second job”

The following are some responses that were coded as a combination:

“Family time, creative writing” “Drinking, hunting, fishing, beach, outdoor activities, sex” “Workout, talk to family and friends” “Sex, sleep, kids, talking, hot tub, music” “Music, casino, going out” “Time off with my family, mow my lawn, walk”

Similar to the coding issues surrounding positive and negative coping, there was difficulty in determining some of the meaning behind answers in relation to isolation and coping with others. For example, if someone stated that they wanted “quiet time with their wife” would that be considered coping with others, just because it involves another person? Or does the fact that they do not want to be around anyone other than their trusted mate still qualify them as being isolated?

The final theme that presented itself was coping via physical or emotional mechanisms. Firefighting is a physical occupation that involves the need for strength and stamina (Poplin et al., 2015; Roberts et al., 2002). As a result of the physical nature of the job and those that perform it, coupled with the “tough guy mentality” that firefighters present, it was expected that firefighters would be more apt to rely on physical coping styles as opposed to emotional ones (L. Miller, 1995; Thurnell-Read & Parker, 2008). Again, an unexpected finding was that only 30% of the respondents favored physical coping mechanism. In contrast, 55% preferred the use of emotional coping mechanisms, with 15% using a combination of the two.

Examples of physical responses were:

“Workout” “Go to the gym” “Work construction” “Play sports” “Watersports”
“Kickboxing” “Split wood” “Jogging” “Physical activity”

The following is a sampling of the emotional responses:

“Be alone” “Drinking” “Pray” “Spend time with my kids” “Read” “Family time”
“Humor” “Talk to a counselor” “Meditate” “Rest” Music” “Working a part-time
job truck driving” “ Go shooting” “Ride my motorcycle” “I surround myself with
family” “Spend time with my daughter, play video games”

Answers that were a combination of the two included:

“Reading, swimming, movies” “Working out, talking to a therapist, talking with
coworkers” “Gardening, motorcycle ride, alcohol, friends” “Sleep, family time,
hiking” “Exercise, yoga, sleep, spend time with family, watch tv, meditate”

Similar issues around coding physical versus emotional coping mechanisms existed as they did for the previous codings. Some of the more difficult answers were those involving sex. Sex has a definite physical component; however, it can also be an emotional form of coping. Without having the opportunity to ask follow-up questions, there is no true way to understand the respondent’s answer.

Mindfulness/Meditation

Previous research in police and fire recruits shows that those who practice mindfulness have a lower number of incidents of PTSD (Arnetz et al., 2013; LeBlanc et al., 2008; B. W. Smith et al., 2011). Respondents were asked to identify how often they practice mindfulness or meditation exercises. Responses were coded as a categorical variable with response categories 1 = Never, 2=Almost Never, 3 = Occasionally, 4 = Almost Always, and 5 = Always.

The variables outlined above are used in Chapter four to help explain differences in self-reported PTSD scale responses. The nature of the dependent variable is continuous, while the independent variables are each categorical in nature. This makes Analysis of Variance (ANOVA)

an appropriate statistical tool to examine the differences in mean PTSD scale responses within different groups of respondents. The results and discussion of the ANOVA models are presented in Chapter four.

CHAPTER IV

FINDINGS

The results of a series of ANOVA models are presented in this chapter. The ANOVA models examine the relationship between the independent variables discussed in Chapter three (for repeated exposure, coping skills, and practicing mindfulness) on the dependent variable, self-reported PTSD scale responses.

Repeated Exposure

The first research question posits a relationship between repeated exposure and responses to the self-reported PTSD scale. This research question is examined using two proxy variables, “years on the job” and “number of calls involving a death”. Table 3 displays the mean values for responses to the PTSD scale by years on the job with ANOVA statistics. The ANOVA model is statistically significant at the $p < 0.05$ level, which suggests that there is a statistically significant difference in mean responses between at least two groups. The ANOVA posthoc Bonferroni’s adjustment (see Table 4) was used to determine which groups showed statistically significant differences in mean responses. Respondents that have been a career firefighter for >20 years had a mean response to the PTSD scale 1.84 points higher ($p < 0.05$) than those that had been a career

Firefighter for 6-10 years.

ANOVA Difference of Means Models

Table 3: Mean Response to PTSD Scale by Years on the Job

	Mean	Frequency
0-5 years	18.58 (5.20)	58
6-10 years	17.06 (5.31)	118
11-15 years	18.76 (5.44)	145
16-20 years	18.87 (4.88)	131
>20 years	18.91 (5.48)	276
Totals	18.55 (5.34)	728

ANOVA Between Group F-statistic 2.79 Prob > F 0.0255* (SD in parenthesis) df = 4

Table 4: Difference in Mean Response to PTSD Scale by Years on the Job

	0-5 years	6-10 years	11-15 years	16-20 years
6-10 years	-1.51			
11-15 years	0.17	1.69		
16-20 years	0.28	1.80	0.10	
>20 years	0.33	1.84*	0.15	0.04

Posthoc ANOVA (Bonferroni Adj.) p<0.05

According to the National Fire Protection Association (N.F.P.A.), from 1980 until 2016 the number of emergency medical calls that United States fire departments responded to has increased by over 450% (National Fire Protection Association, 2018). This may help to explain the differences in reported rates of PTSD in previous studies. Andersen et al. (1991), reported an 8% rate of PTSD, while 11 years later Javidi & Yadollahie (2012) reported a 21% rate. As fire departments increased their responses to EMS calls, it may be that firefighters encountered more instances of traumatic calls, such as people dying.

Table 5 displays the mean values for responses to the PTSD scale by the number of calls involving a death with ANOVA statistics. The ANOVA model is statistically significant at the

p<0.05 level, which suggests that there is a statistically significant difference in mean responses between at least two groups.

Table 5: Mean Response to PTSD Scale by # of Calls Responded to with a Death

	Mean	Frequency
0 calls	17.71 (5.77)	28
1-10 calls	17.77 (5.10)	405
11-20 calls	19.32 (5.32)	239
21-30 calls	20.15 (4.86)	32
>30 calls	22.5 (6.52)	24
Totals	18.54 (5.33)	728

ANOVA Between Group F-statistic 7.83 Prob > F 0.0000* (SD in parenthesis) df = 4

The ANOVA posthoc Bonferroni's adjustment (see Table 6) was used to determine which groups showed statistically significant differences. Respondents that have experienced 11-20 calls involving a death had a mean response to the PTSD scale 1.54 points higher (p<0.05) than those experiencing 1-10 calls. Respondents that experience greater than 30 calls involving a death had a mean response to the PTSD scale 4.78 points higher than those who did not respond to a call involving a death, 4.72 points higher than those experiencing 1-10 calls involving a death, and 3.17 points higher than those responding to 11-20 calls involving a death.

Table 6: Difference in Mean Response to PTSD Scale by # of Calls Responded to with a Death

	0 calls	1-10 calls	11-20 calls	21-30 calls
1-10 calls	0.06			
11-20 calls	1.60	1.54*		
21-30 calls	2.44	2.37	0.83	
>30 calls	4.78*	4.72*	3.17*	2.34

Posthoc ANOVA (Bonferroni Adj.) p<0.05

The results of the two ANOVA models suggest that there is a relationship between repeated exposure and self-reported PTSD symptoms. Years on the job was used as a proxy for repeated exposure to all types of calls, but the main difference of responses was between 6-10

years and greater than 30 years. Number of calls responded to with a death was a proxy measure for repeated exposure to more traumatic calls. In this case the highest category, greater than 30 calls in a year had a statistically significant higher score on the PTSD scale than all other categories except for 21-30 calls. These findings suggest that repeated exposure to more traumatic calls may be a more powerful indicator than just repeated exposure, as measured by years on the job. More research is needed to examine this relationship

Coping Skills

The open-ended question pertaining to how the respondent copes with stress revealed two themes that are used to examine coping skills on the self-reported PTSD scale. Table 7 displays the mean values for responses to the PTSD scale by Positive and Negative coping with ANOVA statistics. The ANOVA model is statistically significant at the $p < 0.05$ level, which suggests that there is a statistically significant difference in mean responses between at least two groups. The ANOVA posthoc Bonferroni's adjustment (see Table 8) was used to determine which groups showed statistically significant differences. Respondents that use a negative style of coping had a mean response to the PTSD scale 1.92 points higher ($p < 0.05$) than those that use a positive style of coping.

Table 7: Mean Response to PTSD Scale by Positive v. Negative Coping Activities

	Mean	Frequency
Positive	18.36 (5.34)	541
Negative	20.29 (5.27)	85
Combination	19.03 (5.92)	33
Totals	18.64 (5.39)	659

ANOVA Between Group F-statistic 4.83 Prob > F 0.0082* (SD in parenthesis) df = 2

Table 8: Difference in Mean Response to PTSD Scale by Positive v. Negative Coping Activities

	Positive	Negative
Negative	1.92*	
Combination	0.66	-1.26

Posthoc ANOVA (Bonferroni Adj.) $p < 0.05$

The results of the ANOVA model indicate that there is nearly a two-point differential in those that use positive versus negative coping strategies. This conclusively suggests that the use of negative coping mechanisms such as avoidance and alcohol use are ineffective in helping to treat or prevent PTSD. Conversely, practicing positive coping skills, such as talking to a professional or practicing mindfulness may aid in the prevention and treatment of PTSD.

Finally, Table 9 displays the mean values for responses to the PTSD scale by Introverted and extroverted coping with ANOVA statistics. The ANOVA model is statistically significant at the $p < 0.05$ level, which suggests that there is a statistically significant difference in mean responses between at least two groups.

Table 9: Mean Response to PTSD Scale by Isolated v. Coping Activities with Others

	Mean	Frequency
Isolated	19.02 (5.37)	443
With Others	17.26 (5.21)	176
Combination	20.52 (5.29)	40
Totals	18.64 (5.39)	659

ANOVA Between Group F-statistic 9.58 Prob > F 0.0001* (SD in parenthesis) $df = 2$

The ANOVA posthoc Bonferroni's adjustment (see Table 10) was used to determine which groups showed statistically significant differences. Respondents that engage in coping activities with others have a 1.76 lower mean response to the PTSD scale than those who engage in isolated coping activities ($p < 0.05$). Those who engage in a combination of isolated and coping

activities with others have a 3.26 higher mean rating on the PTSD scale than those who engage only in activities with others ($p < 0.05$).

Table 10: Difference in Mean Response to PTSD Scale by Isolation v. Coping Activities with Others

	Isolation	With Others
With Others	-1.76*	
Combination	1.49	3.26*

Posthoc ANOVA (Bonferroni Adj.) $p < 0.05$

The results of the ANOVA comparison show that those who use isolated coping mechanisms have a 1.76 higher PTSD scale score than those who use coping mechanism involving others. This is consistent with previous research that states avoidance and disengagement coping were ineffective ways of coping (R. Beaton et al., 1999; Held et al., 2011). The results of this study suggest that the utilization of other people in coping may cause the firefighter to have a better outcome than those that rely solely on themselves.

The respondents in the survey definitely had an affinity to using emotional coping mechanisms with 55% stating that they use only emotional forms of coping and another 15% using a combination of physical and emotional. With that being said, there was not a statistically significant difference between the two. I posit that nearly all of those that used negative coping mechanisms were also in the emotional category. This is also a topic for future research.

Mindfulness

Table 11 presents the mean values for responses to the PTSD scale by how often respondent practices mindfulness or meditation including the statistics for the overall ANOVA model.

Table 11: Mean Response to PTSD Scale by Frequency Practicing Mindfulness/Meditation

	Mean	Frequency
Never	17.83 (5.44)	389
Almost Never	18.37 (4.78)	162
Occasionally	20.10 (5.29)	158
Almost Always	21.357 (5.18)	14
Always	24.5 (6.36)	2
Totals	18.53 (5.35)	725

ANOVA Between Group F-statistic 6.89 Prob > F 0.0000* (SD in parenthesis) df = 4

The ANOVA model is statistically significant at the $p > 0.05$ level, which suggests that there is a statistically significant difference in mean responses between at least two groups. The ANOVA posthoc Bonferroni's adjustment (see Table 12) was used to determine which groups showed statistically significant differences. Respondents that suggested they practice mindfulness or meditation occasionally had a mean response 2.26 points lower than those who never practice mindfulness or meditation ($p < 0.05$) and a mean response 1.72 points lower than those who almost never practice mindfulness or meditation ($p < 0.05$).

Table 12: Difference in Mean Response to PTSD Scale by Frequency Practicing Mindfulness/Meditation

	Never	Almost Never	Occasionally	Almost Always
Almost Never	0.54			
Occasionally	2.26*	1.72*		
Almost Always	3.52	2.98	1.25	
Always	6.66	6.12	4.39	3.14

Posthoc ANOVA (Bonferroni Adj.) $p < 0.05$

The results of the ANOVA model suggest that a relationship may exist between the practice of mindfulness and lower PTSD scores. These results are slightly inconclusive. Over 75% of the respondents either do not practice or almost never practice mindfulness. Only 2% practice mindfulness almost always or always. Because of the disparity in the number of respondents, additional research is needed.

The data shows that several different factors can have an effect on the level of PTSD related symptoms. There continue to be areas for future research to be conducted. The following chapter will explore some of those opportunities as well as offer some recommendations that fire departments can implement that may help to prevent or lessen PTSD related symptoms.

CHAPTER V

CONCLUSION

Discussion

I recently heard of a firefighter who was medically retired due to PTSD. The city had to pay the medical expenses of the firefighter as well as pay for the firefighter's early retirement. Additionally, the city incurred overtime hours to replace the retired firefighter plus the cost of recruiting and training their replacement. In all, the cost to the department was nearly \$250,000. Hiring and training in the fire service is expensive and departments need to find less expensive ways to retain firefighters. Based on the findings from this study, I will make suggestions to the fire service to help departments help their firefighters before the PTSD problems get to the point where they need to replace the firefighter.

The data collected in this study aimed to evaluate if there is a relationship between a firefighter's repeated exposure to traumatic events and their self-reported level of PTSD related symptoms. The data suggests that in fact there is a relationship. Identifying that repeated exposures increase PTSD scores is important. However, given the job that firefighters are tasked

with performing, that is something that will continue to occur. Therefore, the fire service must determine a way to identify and monitor the PTSD related symptoms of firefighters.

The data suggests that the more that a firefighter is exposed to traumatic events the higher their level of PTSD symptoms. This study evaluated this on two different levels that are closely related. The first was based on the number of times in the past year the respondent responded to a call involving a death. The results illustrated that the more calls a firefighter responds to where someone dies, increases their PTSD symptom score. The same also proved to be the case for the number of years a firefighter has been on the job. Their length of services has a direct positive relationship to their PTSD symptom score.

The fact that both independent variables had similar findings is not surprising. Both variables demonstrate an example of repeated exposure. The difference is that one is more concentrated over a shorter amount of time than the other. This is consistent with previous literature that states that repeated exposure increases the propensity for PTSD (Corneil et al., 1999; Haslam & Mallon, 2003; LaFauci Schutt & Marotta, 2011; Nydegger et al., 2011).

Conservation of Resources Theory

The Conservation of resources theory essentially states that a person has a limited amount of resources with which to cope. When one of those resources is used, the resource needs to be replaced. However, when a person has not had the opportunity to replace a resource and is tasked with depleting that particular resources more, they fall further behind. The theory also suggests that when placed in a situation where those resources continue to be taxed, the person will use a quick fix strategy that will appear to give them short-term benefits but in the end may make things significantly worse (Hobfoll, 1989; Hobfoll & Schumm, 2002).

The data in this study supports this theory. As firefighters use their emotional resources over time and do not replenish them adequately, things get worse. This is evidenced with the data pertaining to repeated exposure. In both cases (amount of calls in a year and years of service) there is an increase in the PTSD scale scores.

This may also offer an explanation to the high score associated with firefighters in their first five years of service. I suggest that the initial entry into the fire service exposes many people to things they have never seen before. This takes a greater toll on the newer firefighter's emotional resources. As time passes, firefighters become conditioned to seeing some of the things they see. The calls that may have bothered someone as a rookie now are routine and have little to no effect on them. Yet the accumulation of the "bad" calls over the course of a career, do end up depleting their emotional resources.

Recommendations

The fire service in the United States is required to submit electronic reports for every call they respond to. Most fire departments use software that involves the creation of a database that includes the date and type of call and also the firefighters that responded. I posit that an extra field can be created in the database that will allow departments to track the number of traumatic calls that a firefighter responds to. Future studies may want to delve deeper into whether there is a specific number of events that exponentially increases a firefighter's PTSD score. The software would be helpful at tracking when a firefighter is approaching that number of calls thus alerting the department that the member should be evaluated to gauge their PTSD symptoms.

Coping mechanisms and strategies also play a major role in whether or not a firefighter develops PTSD (Milen, 2009; Nydegger et al., 2011). The findings in this study were consistent with those in previous studies. The respondents who used positive coping strategies had significantly lower PTSD symptom scores than those who used negative coping mechanisms. The

key is for the fire service to help foster the use of positive coping strategies. The second part of this analysis may be part of the key to that. Firefighters are typically thought to be extroverts (Wagner et al., 2009). In turn, one might assume that firefighters would prefer to use coping mechanisms that involve others. However, this research had opposite findings. The data shows that 70% of those surveyed prefer either isolation (55%) or a combination of isolation and being with others (15%).

Critical Incident Stress Debriefing (CISD) is a process that was created by Jeffrey Mitchell (a firefighter-paramedic who later became a PhD) in 1974 as a way for firefighters to decompress in a group setting following a traumatic event:

“A Critical Incident Stress Debriefing can best be described as a psycho-educational small group process. In other words, it is a structured group story-telling process combined with practical information to normalize group member reactions to a critical incident and facilitate their recovery. A CISD is only used in the aftermath of a significant traumatic event that has generated strong reactions in the personnel from a particular homogeneous group. The selection of a CISD as a crisis intervention tool means that a traumatic event has occurred and the group members’ usual coping methods have been overwhelmed and the personnel are exhibiting signs of considerable distress, impairment or dysfunction.” (Mitchell, 1999, p. 165)

There has been significant controversy in recent years related to the use of CISD for firefighters (Harris, Baloğlu, & Stacks, 2002; Jeannette & Scoboria, 2008; Kagee, 2002). I suggest that part of the reason for the questions about effectiveness may have to do with CISD being a group coping strategy. There is an opportunity for future research to evaluate whether the effectiveness pertains to this being a form of coping that involves others when a majority of firefighters may prefer isolated strategies.

The challenge for the fire service is to create opportunities for firefighters to utilize positive isolated coping strategies. One of the ways that has been found to be successful is the use of mindfulness and meditation exercises (Kabat-Zinn et al., 1992; B. W. Smith et al., 2011). Again, this study's findings were consistent with previous findings that those that participated in mindfulness on a regular basis had lower PTSD symptom scores. However, the data in this study was limited by the small number of respondents that practice mindfulness on a regular basis.

Although mindfulness and meditation appear to be an effective means of reducing PTSD symptom scores, the challenge is the implementation of a mindfulness program in the fire service. The most effective place to begin is where previous studies have been conducted, in the fire academy (Arnetz et al., 2013; J. Miller, Fletcher, & Kabat-Zinn, 1995). When recruits are hired they are a captive audience that are required to participate and pass all sections of the academy. The challenge that exists is overcoming the culture that exists for the veteran firefighters (Thurnell-Read & Parker, 2008). It has been my experience that many firefighters are not open to the practice of mindfulness or meditation.

Future Research

The data gathered in the open-ended question offers some interesting findings. My personal experience has been that firefighters have a tendency towards cynicism. When asked to complete an anonymous survey, there is a tendency towards thinking that there is a way to trace the information back to the person taking it. To me, one of the most significant and meaningful aspects of the survey is the candor that some of the respondents offered. For a firefighter to share information in a survey about ways in which they are using self-destructive behavior was surprising.

The other interesting piece of information was regarding the respondent's preference towards coping alone rather than with other people. I am curious as to whether they prefer that

because they do not want to look vulnerable to others or if they truly prefer to cope by themselves. Perhaps part of this has to do with firefighters always being around other people. They are typically in a group environment while at work. I wonder if their preference for isolation allows them to leave the “firefighter mentality” at the door and gives them the freedom to feel emotions that otherwise they may be too embarrassed to show.

The open-ended question truly offered more insight into the ways that firefighters cope. Future research should be conducted utilizing a qualitative study. This would allow the researcher to gain more in-depth knowledge about the firefighter. They would be able to ask questions, hear the answer that was verbally given as well as the answer that was suggested with body language, facial expression, and voice inflection. This would then give the researcher the ability to ask more detailed questions to gain a clearer understanding.

As I mentioned earlier, the challenge with a qualitative study is getting past that level of cynicism and gaining the trust of the firefighter. I wonder if part of the reason I received such candid answers was because I am a firefighter which presents with an inherent level of trust. Using firefighters (that do not have any connection to the respondent) may be the way to proceed with this research.

Additionally, future research needs to be conducted to evaluate whether or not there are differences in the concentration of exposures. Is the firefighter that has been exposed to 30 deaths over the course of 20 years effected the same way as a firefighter that has 30 deaths in one year? The results of a study that focused on concentration of exposure could play a major role in the prevention of PTSD symptoms.

Limitations

This survey had some limitations. The biggest limitation involved the modification of the PDS-5 from a 24 question survey to the survey that was used. Despite having performed

statistical analysis that tests the validity of the survey used, I cannot be certain that the scale is valid without much more research. Due to this, the finding in this survey may not be able to be used for comparison with other studies in Emergency Management, the Fire Service, or Psychology that use the larger validated scale.

Another major limitation was surrounding the inability to clarify answers. The survey was performed as an Internet multiple-choice survey. This limited the respondent to only being able to respond with the answers given. There is also a concern regarding the level of openness and honesty that a firefighter will have when participating in a survey (Thurnell-Read & Parker, 2008). I was surprised by the number of respondents that shared shockingly open details about themselves. Those answers make me question whether there are other respondents that were too embarrassed or just unwilling to share such personal details about the ways in which they cope.

This study was performed using only career firefighters from Massachusetts. This convenience sample deviates from a random sample that would incorporate firefighters from around the country or world. Therefore, this study is not considered generalizable. This brings a question of whether there are cultural differences in other parts of the country or world that may have an effect on PTSD symptoms. Additionally, the majority of firefighters in the United States are volunteers. Does being a career or volunteer firefighter have an effect on these findings?

For the last several years there has been a conversation in the fire service about the need for safety. The slogan has been to develop a “culture of safety” (Pessemier, 2008; Poplin et al., 2015). Additionally, studies show that firefighters are more prone to cancer than the rest of the population (Fritschi & Glass, 2014; LeMasters et al., 2006). There are also studies that show the increased likelihood of a firefighter suffering a cardiac event (D. L. Smith et al., 2013; Staley, Weiner, & Linnan, 2011). Firefighters are more likely to suffer from alcoholism and have other

substance abuse problems (Murphy, Beaton, Pike, & Johnson, 1999; Murphy et al., 2002; North et al., 2002).

I agree that there needs to be a cultural change in the fire service. I believe that cultural change needs to include those items that cannot be seen on an accident report or under a microscope. Firefighters are between 3 and 5 times more likely to experience PTSD than the general public (Andersen et al., 1991; Javidi & Yadollahie, 2012). The cultural change also needs to include the psychological well-being of firefighters.

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APPENDICES

Appendix A

1. Sex

Male ____ Female ____ Other ____

2. Age

a. 18-24 b. 25-39 c. 40-55 d. Over 55

3. How long have you been on the department?

a. 0-5 b. 6-10 c. 11-15 d. 15-20 e. Greater than 20

4. Relationship Status

a. Single (never been married) b. Married c. Divorced/Separated
d. In committed relationship

5. Do you respond to EMS calls?

a. Yes as a first responder no transport b. Yes transport BLS patients only
c. Yes transport ALS patients only d. Yes transport all patients e. No

6. Level of EMS certification

a. None b. First Responder c. EMT-B d. EMT-A e. EMT-P f. Other

7. What is the size of your department?
 - a. 1-50
 - b. 51-100
 - c. 101-250
 - d. 251-500.
 - e. Greater than 500
8. Approximate number of calls personally responded to annually
 - a. < 100
 - b. 101-500
 - c. 501-1000
 - d. >1000
9. Approximately how many calls have you responded to in the last year where someone has died?
 - a. 0
 - b. 1-10
 - c. 11-20
 - d. 21-30
 - e. over 30

For questions, 10-23 please use the following scale

1-Never 2-Almost Never 3-Occasionally 4-Almost Always 5-Always

10. Have you had recurring unwanted thoughts about a traumatic call?
11. Have you had nightmares or upsetting dreams about a traumatic call?
12. Have found yourself reliving a traumatic call as if it were happening again?
13. Have you avoided things that make you think of a traumatic call?
14. Have you found yourself having issues with irritability, sleeplessness, jumpiness, or anger following a traumatic call?
15. Have you had sleep issues (either inability to sleep well or sleeping excessively)?
16. Have you had physical reactions following a traumatic call?
17. Have you found yourself being overly alert or on guard (example: checking to see who is around you, not being comfortable with your back to a door) following a traumatic call?
18. Have you found yourself having trouble concentrating following a traumatic call?
19. Have you felt sad for an extended period of time?
20. Have you felt hopeless or helpless?

21. Have traumatic calls had a negative impact on relationships with others?
22. Have you had thoughts of suicide?
23. Have you ever participated in Mindfulness or meditation exercises?
24. Have you ever participated in Mindfulness or meditation exercises?
- a. Yes b. No
25. How many alcoholic beverages do you drink per week?
- a. 0-2 b. 3-7 c. 8-12 d. 13-20 e. Greater than 20
26. Do you use recreational drugs?
- a. Yes b. No
27. Do you feel as though you have a drinking or drug use problem?
- a. Yes b. No
28. Have you ever been treated for psychiatric issues?
- a. Yes b. No
29. Do you take medication for psychiatric issues?
- a. Yes b. No
30. Do think that it is bad or a sign of weakness for someone to seek counseling?
- a. Yes b. No
31. Do you think it is bad or a sign of weakness for someone to take medication for psychiatric issues?
- a. Yes b. No
32. Are you aware of any of your colleagues that are in counseling?
- a. Yes b. No

33. Are you aware of any of your colleagues that may have a drug or alcohol problem?

- a. Yes
- b. No

34. How do you relieve stress?

(write in answer) _____

Thank you for taking the time to complete this survey. If this survey brought about emotions that you feel you would like to discuss with a professional, the following resources may be helpful

Professional Firefighters of Massachusetts Member Assistance Program can be reached at (617) 523-4506. If you call after hours, leave a voicemail and it will immediately be sent to a member of the program

National Suicide Prevention Lifeline – (800) 273-8255. This line is manned 24 hours a day

Appendix B

PARTICIPANT INFORMATION FORM

Firefighter's Reaction to Trauma

You are invited to be in a research study about Stress and PTSD in the fire service, that is being conducted by Firefighter-Paramedic Jason Lovitz, Master's candidate, Oklahoma State University, under the direction of Dr. Haley Murphy, Fire and Emergency Management Administration, Oklahoma State University. Your participation in this research is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this project at any time. If you agree to be in this study, we would ask you to do the following things: Complete an online survey that will take approximately 15 minutes. Compensation: You will receive no payment for participating in this study. However, you will have the option to enter a drawing for one (1) \$100 gift certificate to Firestore.com.

Confidentiality: The information you give in the study will be anonymous. This means that your name will not be collected or linked to the data in any way. The researchers will not be able to remove your data from the dataset once your participation is complete. This data will be stored in a password protected computer indefinitely. The research team will ensure anonymity to the degree permitted by technology. The data will be shared with the Professional Firefighters of Massachusetts, however there will not be any identifying characteristics of individual participants.

Your participation in this online survey involves risks similar to a person's everyday use of the internet. If you have concerns, you should consult the survey provider privacy policy at <https://www.qualtrics.com/privacy-statement/>.

Contacts and Questions: If you have questions about the research study itself, please contact the Principal Investigator at 757-613-6724, jlovitz@okstate.edu. If you have questions about your rights as a research volunteer, please contact the OSU IRB at (405)744-3377 or irb@okstate.edu. If you agree to participate in this research, please click “I Agree” to continue.

I Agree

I Disagree

VITA

Jason E. Lovitz

Candidate for the Degree of

Master of Science

Thesis: PTSD AND COPING MECHANISMS IN THE FIRE SERVICE

Major Field: Fire and Emergency Management Administration

Biographical:

Education:

Completed the requirements for the Master of Science in Fire and Emergency Management Administration at Oklahoma State University, Stillwater, Oklahoma in May 2019.

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